1942.
NEW ZEALAND.

STATE FOREST SERVICE.

ANNUAL REPORT OF THE DIRECTOR OF FORESTRY FOR THE YEAR ENDED 31ST MARCH, 1942.

Presented to both Houses of the General Assembly pursuant to Section 64 of the Forests Act, 1921–22.

The DIRECTOR OF FORESTRY to the Hon. the COMMISSIONER OF STATE FORESTS.

SIR,— Wellington, 14th July, 1942.

I have the honour to present herewith, pursuant to section 64 of the Forests Act, 1921–22, the annual report of the operations of the State Forest Service for the year ended 31st March, 1942.

I have, &c.,
ALEX R. ENTRICAN,
Director of Forestry.

The Hon. the Commissioner of State Forests.

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REPORT.

CHAPTER I.—FOREST POLICY.

1. *General.*—All departmental activities have been reduced to a bare maintenance basis, except in the case of timber-production, forest appraisal, fire prevention, and rehabilitation planning. Even so, timber-control work under the Emergency Supply Regulations has so strained departmental resources that it has been necessary to work extended hours—nominally forty-six per week, though in numerous cases, many more. To meet expanded demand for timber resulting from allied requirements it has been impossible to avoid appeals for the reservation of numerous officers from military service.

2. *Recruitment and Training.*—It has been estimated that the staff will require to be at least trebled during the first post-war decade, and plans continue to be studied for the large-scale training involved. There will be unrivalled opportunities for officers of ability not merely in the field of general forestry, but in the specialized branches of botany, entomology, surveying, engineering, economics, and law. In the meantime, recruitment of trainees from secondary schools is being actively pursued, even though such officers seldom receive more than a year or two of training before taking up military service. Short as it is, this period is invaluable in directing the thoughts of the better men towards specific lines of forestry study which may become available to them during their military service either in New Zealand or abroad.

3. *Indigenous Forest Resources.*—A shortage of indigenous timbers in the relatively near future is a certainty and not a bogy, but it is a major objective of the national forest policy to alleviate its seriousness by careful conservation of all remaining resources. Limitation of the kauri and white-pine cut to absolutely essential demands has already been achieved, and early extension of this policy to totara and matai is essential, particularly in the interest of rehabilitation housing, leaving rimu and insignis pine to meet the bulk of war demands. Extensive reconnaissance of insignis pine and the more accessible rimu resources is being undertaken as a preliminary to eventual complementary control of their cutting.

4. *Indigenous-forest Management.*—Permanent indigenous-forest communities with modern amenities should and can replace the uncomfortable transitory and "ghost" villages of the past century. Major indigenous-forest areas are accordingly being selected as management units upon which long-life sawmills may be established and rehabilitation activities inaugurated at the conclusion of hostilities.

5. *Indigenous-forest Knowledge.*—Lack of knowledge of soils, of ecology, and of silviculture in the indigenous forests is serious. It is vital that this deficiency be remedied by appropriate reorganization of work and concentrations of staff. As from the next planting season, all interplanting with exotics and other silvicultural treatments on untended forests will be terminated and thereafter be concentrated on management units adequately staffed and equipped to give a return commensurate with the expenditure and time given to the various investigations. Such units will be established on both commercial and protection forests and managed on a multiple-use basis—that is, not only for the sustained production of timber, but for the preservation and improvement of recreational, historical, scientific, watershed, and counter-erosion values.

6. *The Tawa Forests.*—Tawa is the only general-purpose-factory-use hardwood which exists in sufficient quantities as to make the Dominion independent of foreign supplies of such woods as oak, beech, birch, maple, elm, &c. The tawa forests therefore merit much more attention than previously accorded them. They are widespread and contain a fair distribution of age-classes, thus favouring their management on a sustained-yield basis, and a suitable unit has been selected on the Mamaku Plateau in which silvicultural and related problems will be investigated. Concurrently, the wider utilization of tawa timber will be developed, and, as will appear later in this report, a solution has already been found to the problems of drying tawa and protecting it from fungal and insect attack.

7. *Exotic-forest Resources.*—The demand for exotic timbers much exceeds the available supply, and assessment surveys and management plans for the older State exotic forests are being persevered with in order that a maximum yield of sawlogs may be effected at as early a date as practicable. The log-frame type of sawmill already developed by the Department has advanced the date of sawlog production by many years, but forest wastage in very short and crooked logs is still large enough to warrant investigation into the development of special sawing equipment for such material. The departmental policy of planting a variety of species of general utility rather than of concentrating upon insignis pine continues to find vindication with every passing year. Larch and Douglas fir, in particular, are filling many unexpected uses and the quality of the timber produced both by these species and by Corsican pine augurs well for their future.

8. *Silviculture in Exotic Forests.*—In view of the general man-power position of the Dominion, forest staffs have been reduced to such an extent that they are barely able to ensure the safety of the forests, and the silviculture work effected has been purely incidental to fire-prevention and utilization activities. It is to be noted, however, that while this deferment of silvicultural treatment will do some irreparable harm to many forest stands it will provide a huge reservoir of rehabilitation work.

9. *Local Exotic Forests and Farm Forestry.*—Forestry should be an integral part of the farm economy of most districts, and the establishment of relatively small State exotic forests has been accepted as a major rehabilitation effort of the Forest Service. Land-acquisition, covering as it will numerous titles, some of them subject perhaps to mining rights, &c., will be difficult, but the advantage of producing timber-supplies locally and of providing seasonal employment for farm workers make it imperative to solve these various problems, no matter how involved. Complementary to the State effort, encouragement should be given in suitable districts to the proper development of farm forestry, and a special study of this branch of forestry in other countries has been commenced as a preliminary to the drafting of suitable recommendations.

10. *Integration of Indigenous and Exotic Forest Utilization.*—Exotic softwoods must replace the indigenous timbers as extensively as practicable and as rapidly as the exotic forests will yield suitable sawlogs. Only by this means can the Dominion be made self-sufficient in timber-supplies. Most

mportant of all, it means that insignis pine, ponderosa pine, Corsican pine, Douglas fir, and larch must be as widely used for building purposes as they are at present employed for boxing and crating work. Although demand exceeds supply even for boxing-work, advantage is being taken of every opportunity which offers for experimenting with and demonstrating the utility of these woods for building purposes, and departmental buildings erected in various timbers are yielding invaluable information for future guidance.

11. *Forest Finance.*—The basic financial objective of forest policy is to make State forestry operations at least a self-supporting activity, if not ultimately a contributor to the general revenues of the country. While this appears possible on a basis of pure revenue and expenditure, it is just as impossible for revenues to meet past expenditures compounded at 4½ per cent. Actually in some current sales of forest produce recoupment of the accumulated debt against some good forest is being achieved, but there are many poor compartments and forests which must contribute a heavy loss. Typical of the former are sales of clear-cut larch from compartments carrying an accumulated charge of £60 per acre, but increased to £80 to cover failed areas in the same forest. Measured as a stand of 3,200 cubic feet, the timber is sold on a royalty basis of 6d. per cubic foot, which is equivalent to a royalty of 10s. per 100 board feet—an excessively high figure and a good reason why national forestry expenditures should not bear interest compounded at 4½ per cent. In contrast, a poor forest—*e.g.*, Dumgree (Nelson Conservancy) established in 1903—carries an accumulated debt of £62,918, of which £46,765, or over 74 per cent., is accumulated interest, and is unlikely ever to yield a revenue equal to even 5 per cent. of the accumulated charges. Representations to deal with such cases are being made, but a reliable financial survey of the whole of the exotic forests will only be possible with the completion of assessment surveys and forest-management plans now seriously delayed by the war.

12. *Soil-erosion.*—Forest clearing and grassing have ceased on all State-owned hill lands, and attempts to grow one blade of grass where two trees grew before are now recognized as the root cause of the Dominion's erosion problem. Should further forest clearing be allowed on any lands—private or Native—if it contributes to accelerated erosion? In the belief that the public is convinced of the necessity for controlled clearing of all forested land, irrespective of ownership, appropriate recommendations are being drafted for consideration by the Government.

CHAPTER II.—ADMINISTRATION.

13. *Permanent and Temporary Staff.*—Permanent, 198; temporary, 130.

14. *Military Service.*—Second New Zealand Expeditionary Force, 39; Air Services, 14; Territorials, 48; Home Guard and E.P.S., 148; and W.W.S.A., 3.

15. *Casual Staff.*—Average for year, 922; for 1941, 1,194; and for 1940, 1,399.

16. *Honorary Staff.*—Honorary Forest Rangers, 237.

17. *Health of Staff.*—In the interests of health, improvements in accommodation both at camps and in houses continue to be effected.

18. *Safety of Employees.*—The ever-increasing usage of unskilled labour has intensified the necessity for safety-work amongst all classes of employees. The New Zealand Timber Workers' Union and the Dominion Sawmillers' Federation are co-operating in an effort to secure a general improvement in safety-work in the industry. A number of new safety posters have been developed for use in the Service's own operations, and safety slogans and warnings are being changed at more frequent intervals in order to keep employees alive to the danger of carelessness. A supply of safety-helmets sufficient to equip every man engaged in tree-felling in the Waipa logging operations was received from overseas, and it is confidently anticipated that this will serve to reduce the accident rate from falling branches and cones.

While it is pleasing to report that no fatal accidents occurred, there were two of a rather serious nature caused by dead tree-tops or branches falling on employees during felling operations. In all, 188 accidents were reported, under the following headings: Cuts, 60; strains, 43; crushes and bruises, 39; septic wounds, 13; eye injuries, 16; miscellaneous, 17.

19. *Compensation to Employees.*—The Service continues to carry its own accident-insurance risk, and the wisdom of this practice was again proved, as shown below:—

Year.	Total Payments.	Total Wages.	Per Cent. (Approx.).
	£	£	£ s. d.
1940-41	4,470	276,000	1 12 6
1941-42	3,057	245,600	1 4 11

For the past year the estimated premium payable for a comprehensive accident policy would have been £7,600; a saving of over £4,500 has thus been effected.

20. *Recruitment.*—Nine new cadets were appointed, and also a number of female office-assistants for the duration of the war.

21. *University Training.*—Four clerical and four technical trainees attended University courses.

22. *Examinations.*—Candidates: 1941, 9; 1940, 11. Passed: 1941, 4; 1940, 3.

23. *Allocation of Duties.*—Most controlling and senior officers have been assigned important timber-control and E.P.S. duties.

24. *Field and Office Inspections.*—Periodic inspections were made of conservancy field activities, and as a result of the check cruising work of the last two years, timber estimation and valuation is of a higher standard than ever before in the history of the Forest Service. Office inspections were fewer than usual owing to increased timber-control work and shortage of staff. Unfortunately, there is little prospect of any improvement in the position at least for some time to come.

25. *Regional Organization.*—No further changes in regional boundaries have proved necessary, but the difficulties of administering conservancy business in the Wellington, Westland, and Southland-Otago regions indicates that rehabilitation activities will require the setting-up of additional Forest Officer and Forest Ranger districts in these conservancies.

26. *Inter-departmental Co-operation.*—In addition to the usual peacetime contacts with controlling and servicing departments, daily co-operation has proved necessary with the Defence Construction Council, the Housing Department, the Government Architect's Office, the New Zealand Railways, and the Shipping Controller.

CHAPTER III.—CONSTITUTION OF STATE FORESTS.

27. *Changes in Area.*—During the year 43,326 acres were set apart as permanent and provisional State forest, and 1,195 acres withdrawn from reservation, a net increase of 42,131 acres. The area under State forest reservation now totals 8,802,169 acres, 13·26 per cent. of the land area of the Dominion (see Appendix I).

28. *Changes in Status.*—Comprising mainly protection forests in the South Island, 2,372 acres of provisional State forest were permanently reserved, bringing the total permanent State forest area to 5,715,260 acres, or 64·9 per cent. of the total State forest area. Of the area withdrawn, the major portion 734 acres, was vested in the Nelson City Corporation for water-supply purposes.

CHAPTER IV.—FOREST MANAGEMENT.

29. *Surveys.*—Areas totalling 3,650 acres were topographically surveyed and 2,760 acres were subdivided into compartments. In connection with timber appraisals, 123 areas totalling 17,100 acres were surveyed, while 4,160 acres were covered by reconnaissance. Twenty miles of roads and 13 miles of boundaries were also surveyed.

30. *Mapping.*—Two new topographical maps were prepared and 2 stock maps renewed, additions were made to 33 stock and operational maps and 52 copies of these were prepared for general use.

Proclamations dealing with State forests affected 44,511 acres and necessitated 104 additions to the forest registers, while the recording of these and the various privileges granted during the year required 468 additions to the forest atlas. For general purposes 147 plans, 834 tracings, and 40 graphs were prepared, 584 lithographs, &c., coloured, and 321 plans mounted. The issuing of 186 licenses and 472 permits necessitated the drawing of 2,446 diagrams, 17 forest atlas sheets were renewed, and 644 photostat prints and 1,500 helio prints were used by the Service. A map of Kaingaroa Forest and a plan form were lithographed. One hundred and eighty-three negatives were added to the photographic record, bringing the total to 15,519.

31. *Forest-management Staff.*—Two trained assistants left for military service and the calling-up of the Chief Inspector under mobilization order further weakened the Head Office technical forest staff, where the Senior Working Plans Officer has only one trained assistant instead of three. Conservancy staffs, which remained virtually unchanged, are still most inadequate, while two conservancies are without trained staff. Retention of the remaining staff in both Head Office and conservancies is regarded as essential, as these officers' services are indispensable for the planning of forest work, for the maintenance of essential timber-production, and of rehabilitation schemes. The location of sites for new forests, the choice of existing forests for rehabilitation work, and the planning of the necessary operations within such forests are all activities demanding the exercise of specialized knowledge related to silviculture and forest management.

32. *Forest Working Plans.*—A working plan was finalized which regulates the felling of kauri during the quinquennium April, 1941, to March, 1946. The working-plan area is "the kauri circle," and comprises those State forests of Auckland Conservancy in which kauri is a component part of the growing stock. The kauri-working circle is subdivided geographically into six blocks in which the State forests concerned are the "compartments" or units of working. In accordance with statutory requirements, the section known as the felling plan specifies the maximum area from which kauri shall be taken annually and, secondly, the maximum amount of timber that shall be taken annually. The total maximum cut prescribed for the five-year period is 900,000 cubic feet, of which 380,000 cubic feet is from dead kauri and 520,000 cubic feet from living kauri-trees. An additional permissible cut for war needs is provided for.

At the close of the year the working plan for Whakarewarewa Forest was in draft form, and enumeration surveys of Waiotapu Forest had commenced. The Hanmer Forest working plan was completed as to Part I, Growing Stock Enumerations and Compartment Descriptions. Conical Hill Forest, area 4,200 acres, was resubdivided into 24 compartments. Under the original subdivision of thirty years ago there were 204 compartments of an average size of 16 acres. Bearing in mind that the forest compartment is the unit of forest management, it will be apparent that in New Zealand the degree of intensity of utilization and marketing is as yet far from being sufficiently developed as to warrant the detailed description and working of forest subdivisions as small as 16 acres. On the other hand, the new average size of 175 acres will be adequate for years to come.

During the year a standard method of assessment of growing stock was devised to ensure that enumerations and descriptions of all exotic-forest compartments are carried out on similar lines. Strip plots are employed, with permissive use of rectangular sample plots under special circumstances. Two sample trees are measured in each of the crop class and thinning class, and one in the suppressed class. Volume of the malformed-tree class, often too abundant in untended stands and unthrifty species, is obtained by the use of locally-prepared volume tables. Volumes are expressed up to 6 in. top, 4 in. top and to tip, thus providing an estimate of sawlog volume, of volume of prop, post, and pulp logs, and, finally, of total volume for increment purposes.

A compartment description form was drafted and printed, and has proved entirely satisfactory. Sections, chapters, and maps required for working-plan reports were standardized, and these also have proved quite satisfactory in use.

CHAPTER V.—SILVICULTURE.

33. *General.*—Shortage of man-power again seriously affected the annual programme of silvicultura works. Forest formation or establishment again diminished by one-quarter of the previous year's area, and only 1½ per cent. of the area of planted forests were improved, as against 4 per cent. in 1940–41 and 4½ per cent. in 1939–40. By reason of the maldistribution of age-classes referred to in recent reports, these figures are woefully small, but it is satisfactory to record that the two very important operations—high pruning and moderately heavy thinning—were given much more attention than in either of the two previous years.

34. *Natural Regeneration.* — In Compartment 8, Omahuta Forest, departmental felling and extraction under working plan has been in progress for some time. Owing to urgent orders for selected timber for war purposes it was not possible to clean up the felling area at the time, but later in the year all the kauri-trees above the minimum d.b.h. limit of 33 in. were taken, with the exception of seed-trees were necessary. This, the first kauri stand to be felled under a silvicultural system, is of great interest as it demonstrates the appearance of a stage through which many of the kauri stands will now pass—namely, removal of the first permissible cut under the selection system. The appearance of the stand is quite satisfactory so far as poles and trees are concerned, and the progress of natural regeneration will be kept under close observation. Intensive assistance to natural regeneration was attempted by removing in part the scrub vegetation from around the base of four kauri seed-trees in Compartment 1, Omahuta Forest, which carries in the main a stocking of podocarps. Germination, if any eventuates, should come next spring. This compartment carries excellent podocarp regeneration, but, naturally, it is one of the objects of management to extend kauri stocking by all possible measures. General observations made during the year point towards kauri regeneration being adequate for full restocking of felled areas.

During the year several fairly extensive areas of land bearing established kauri regeneration were inspected. Unfortunately, only the smallest of these are in existing State forests, and the other larger areas should be acquired for the purpose of evening up the distribution of kauri age-classes, thus enabling kauri-forest management in perpetuity under sustained timber yield.

At Whirinaki podocarp-forest-worked-over areas germinated freely to kahikatea, matai, and rimu.

Natural regeneration in clear-felled *Pinus radiata* stands in Rotorua Conservancy more than held its own against mortality in seedlings caused by frost, insolation, or the pine-bark beetle *Hylastes ater*. On study plots under observation the average net seedling increase was from 1,928 to 2,736 per acre, which, if not reduced next year, will be satisfactory. New regeneration was particularly noticeable on subsidiary extraction tracks throughout the felled area in Whakarewarewa Forest. If, as now promised, natural regeneration is successful after clear felling, the management of this species will be much simplified.

35. *Interplanting Indigenous Forests.*—Gaps made by felling and extracting merchantable trees were filled by interplanting shade-bearing exotics such as *Thuya plicata* and *Cryptomeria japonica*. Five hundred and sixteen acres were interplanted in exotics and, in addition, 7 acres were interplanted with the indigenous *Podocarpus totara*. Twenty-one acres were blanked up.

36. *Afforestation.*—Three thousand three hundred and ninety-nine acres of land carrying fern or scrub were afforested. Formation of mixed tree crops was carried out over 872 acres. Clear-felled, wind-thrown, burned, or otherwise damaged or unthrifty areas were replanted over 122 acres, and trees that had died in recent plantings were blanked up over 3,399 acres. Statistics of exotic establishment and silviculture are presented in Appendix II. Including 27 lb of indigenous seed, 1,746 lb. of tree-seeds were collected and extracted.

37. *Nursery Operations.*—A total of 1,386 lb. of tree-seed were sown, yielding 5,281,000 seedlings as at 15th Mrach, 1942 ; 33½ lb. of indigenous seed are included. Trees lifted for planting, transfer, &c., totalled 5,939,000, while 6,593,000 seedlings were lined out. Tree stocks in all nurseries at the close of the year amounted to 20,500,000.

38. *Tending of Indigenous Forests.*—The only ameliorative treatment of indigenous trees was the liberation of kauri saplings and seedlings from overtopping shrubs, and this was done by the normal maintenance personnel. Thus in Warawara Forest the forest caretaker and his part-time assistant released 2,450 well-spaced kauris covering an area of 20 acres.

Liberation of interplanted exotic trees from suppressing shrub-growth was effected over 71 acres, and double-leaders pruned off over 29 acres.

39. *Tending of Exotic Forests.*—On 560 acres tree-plants were liberated from invading fern and other weeds. Three thousand three hundred and twelve acres were low-pruned up to 4 ft. to 8 ft. from the base, and final crop trees were high-pruned over 1,576 acres. Seven hundred and twenty acres were lightly thinned, and 766 acres received a medium to heavy thinning. One hundred and sixty-seven acres were clear-felled.

40. *Silvicultural Investigations.*—In Southland Conservancy a trial direct-sowing was carried out in an attempt to reforest at low cost an area of 20 acres of burned cut-over land. Both broadcasting and spot sowing were tried, and under these methods the best results were obtained with eucalypts and insignis pine respectively. As usual, birds destroyed many seed and seedlings.

In Auckland Conservancy a special inspection and report were made on the growth of pines of the Southern States of the United States of America under planted forest conditions in North Auckland and Coromandel localities.

In Rotorua Conservancy 26 acres were ploughed and disked preparatory to a trial planting of Californian redwood in an effort to improve the early development of this valuable species when planted out on open ground.

41. *Experimental Plots and Statistical.*—A stock-taking was made of all experimental plots that have been established in the State forests. This is an activity that must be centralized under the Silvicultural Branch, and as a result of the stock-taking quite naturally numbers of old plots are being abandoned or overhauled due to excessive duplication, inadequate controls, or data proving consistently negative.

42. *Forest Botany.*—Collection of records on dates of phenological phenomena relating to main exotic and indigenous tree species was continued by field officers under control plan. Additional investigations commenced under control plans were connected with the effect of seed storage upon seed viability ; the quality of insignis-pine seed collected from cones of different ages ; needle-fusion in insignis pine ; regular observation of progress of natural regeneration on clear-felled exotic forest areas, with special reference to mortality caused by pine-bark beetle ; recording of seed-crops according to an arbitrary scale denoting degree of abundance, &c.

Organized collection and testing of tree-seeds which was commenced last year is being continued. Seed of various species of kauri (*Agathis*) from other countries has been received and seedlings raised at Waipoua for planting out in an aboretum at this station. Several species of *Nothofagus* have also been received from South America and will form the nucleus of an aboretum to be established in the South Island, which in time will contain all known *Nothofagus* species.

CHAPTER VI.—FOREST-PROTECTION.

43. *Fire Protection.*—The results of intensified recording of fires adjacent to exotic State forests show that 3,591 were seen and reported from lookouts, although many were land-clearing and rubbish fires and did not endanger standing forest. With a wetter season than the average, fires were fewer in State forests, and only 24 were recorded, covering a total area of 730 acres, or 3,000 acres less than the previous year. The only serious one occurred at Waitangi National Endowment Area (Auckland Conservancy) where a "burning off" fire lit by an inexperienced temporary workman contrary to orders got out of control and scorched in all 118 acres mainly of Southern pines, many of which, fortunately, have an excellent chance of recovery; no other damage was done. Fires reported on outside State forest numbered 44 and burned an area of 5,980 acres, mainly fern, scrub, &c., but in one case in Southland a picnic fire got out of control and destroyed 3,000 acres of commercial flax and pine shelter-belts owned by the Invercargill County Council.

Included in the recorded fires were four sawmills—owned by New Zealand Railways (Mamaku), Messrs C. S. McCully, Ltd. (Christchurch), Messrs. Kilkelly Bros., Ltd. (Motu), and Marton Sash, Door, and Timber Co., Ltd. (National Park).

44. *Fire-hazard Stations.*—Records were kept at established stations in key areas of both indigenous and exotic forests. Though danger periods were generally short-lived during the season under review, the fire-hazard readings proved useful in economizing fire patrols. The location of fire-hazard stations at hill-top lookouts has not been entirely satisfactory, as hazards existing at lower levels even in the immediate vicinity have proved to be much higher. Local instances have been confirmed by American experience.

45. *Fire Districts.*—One new fire district covering an area of 23,000 acres was constituted for the protection of Herekino State Forest, Auckland Conservancy. Sixty-one fire districts with a total area of 3,454,508 acres have been constituted to date; these figures include 39 State forest districts covering 2,676,505 acres, 8 private ones covering 368,639 acres, and 14 others covering 409,364 acres administered by other Government Departments and local authorities.

A review of the administration of private fire districts during the year revealed that private-forest owners are still relying too much on the salutary effect of the fire district law, and are not taking sufficient practical measures for the protection of their forests from fire. It is not in the national interest that private forests should be exposed to serious fire damage or destruction simply through indifference or neglect by the owners, and it is necessary for this Service to secure appropriate powers to direct private-forest owners to carry out essential fire-prevention measures.

Burning by occupiers of land in fire districts pursuant to written permits by Forest Officers showed that the majority of the permittees were conversant with their lawful obligations and exercised reasonable care to ensure that fires did not spread, but isolated instances occurred where occupiers were careless or took unjustifiable risks while burning and menaced the safety of adjoining properties. Occupiers must recognize that a permit to burn, even though the conditions laid down are observed, does not relieve the permittee from any liability for damage caused by the fire.

46. *Forest (Fire-prevention) Regulations.*—The 1941–42 fire season was the first full period during which the Forest (Fire-prevention) Regulations 1940 operated, and reports disclose that their enactment has materially strengthened the administrative machinery in respect to forest-fire protection. Several weaknesses were naturally revealed, the principal one being the overreliance placed upon the use of approved spark-arrester equipment upon locomotives. Although efficient spark-arresters assist materially in reducing fire risk, even the best cannot eliminate the danger from locomotive sparks, and supplementary protection by way of a following patrol seems essential. The regulations are also defective in respect to the use of gas-producers on motor-vehicles. A number of grass fires during the 1941–42 fire season originated from this source, one of them spreading into a pine plantation, and an extension of the regulations in order to control further the use of gas-producer vehicles is under consideration.

47. *Animal Damage.*—Deer and pigs have increased enormously in the Rotorua Conservancy, due mainly to more cover and fewer hunters; the increase in deer has resulted in damage to young planted trees both in Wellington and Canterbury Conservancies. Goats are more numerous in Auckland Conservancy, and, owing to fewer hunters, threaten to become a serious pest. Animals killed in State forests were as follows (last year's figures are in parentheses): Rabbits and hares, 16,317 (16,696); deer, 904 (620); pigs, 1,062 (261); goats, 77 (11); rats, stoats, ferrets, &c., 2,534 (29).

Opossums continue to do considerable damage to *Pinus laricio* and *P. ponderosa* in Southland, *Thuya plicata* in Westland, *and Pinus echinata*, *P. taeda*, and *P. palustris* in Auckland, and to beech-regeneration in Nelson. Opossums destroyed under special Ministerial warrant show an increase of 660 on last year's figures. Of the 1,210 so killed, 76 were in the Auckland Conservancy, which indicates that northward migration is proceeding. Figures supplied by the Department of Internal Affairs show that 259,639 opossums were taken during the 1941 season; of this total 63,860 were trapped in State forests.

48. *General Ecology.*—The accumulation of data and the investigation even during wartime of all insects and diseases of potential silvicultural significance are emphasized as essential to the adequate protection of the entire forest resource and have been actively pursued.

49. *Insects.*—Considerable progress has been made in negotiations with the Commonwealth authorities whereby regulations will be invoked in Australia to prevent the export of hardwoods to New Zealand unless free from termites and other forest and timber insects. No termites were discovered in hardwood shipments examined during the year. Some bamboo tent-poles imported from India were found to be heavily infested with borer, including both pinhole borer (*Dinoderus minutus*) and a species of auger beetle (*Synoxylon anale*). A number of predators and parasites were also observed. The poles were either destroyed or suitably treated to destroy all insects.

The position regarding *Hylastes* attack of *Pinus radiata* is more promising than last year. The plots established in clear-felled areas in Whakarewarewa Exotic Forest showed that though the pine-bark beetle, *Hylastes ater*, was found in all the plots, sufficient insignis-pine regeneration to ensure adequate stocking still survives. In spring, 1941, the stocking of seedlings per acre ranged from 20 to 4,220; by autumn, 1942, the net stocking had increased to a range of 200 to 4,810.

50. *Fungi.*—There has been little fungal disease of major consequence reported from State forests. Damage to *Pinus radiata* at Beaumont (Southland Conservancy) was investigated and was found to be caused by *Dasyscypha calyciformis*, here recorded for the first time in New Zealand. This Dasyscypha is also found on *P. banksiana*, *P. ponderosa*, and *P. laricio* and is widely distributed. It mainly occurs saprophytically on wounds caused by rubbing, on pruning stubs, and on the bark of trees scorched by fire. *Dasyscypha calyciformis* is known as a saprophyte on pines (Pinus spp.), spruces (Picea spp.), and firs (Abies spp.) in Europe, where it has not been reported as causing any damage.

The chief investigation of heart-rot in living trees concerned *Pseudotsuga glauca* from Pukerau (also Southland Conservancy). The fungus appeared to enter the pruning scars of green-pruned, suppressed trees, attacking the heartwood while leaving a small central core and the outer sapwood unaffected.

51. *Damage from Natural Causes.*—The weather on the whole was colder and wetter than usual, heavy falls of snow being recorded in the Main Trunk district and in North Canterbury. At Hanmer the heaviest fall of snow since 1918 damaged larch stands, and in Wellington and Nelson Conservancies the severity of the winter hampered afforestation projects. Unseasonable frosts damaged nursery stock in most districts, while heavy frosts in Auckland and Rotorua reminiscent of the 1931 occurrence caused serious damage to planted areas.

Instances of damage by lightning were recorded for the first time for several years. Several fires were caused in old dry trees, whilst a severe thunderstorm in January caused considerable damage to a line of creosoted telephone-poles at Kaingaroa.

52. *Forest Offences.*—A firm policy of law enforcement has been persevered with as essential to the safety of the forest and the protection of public property. Twenty-nine convictions were secured for offences under the Forests Act—*viz.*, fires, 6; trespass and hunting, 21; timber trespass, 2. Other cases are pending.

CHAPTER VII.—FOREST ENGINEERING.

53. *General.*—While no new major construction work has been undertaken, preliminary surveys essential to important rehabilitation projects in both indigenous and exotic forests have been proceeded with to the limit of the personnel available.

54. *Roads and Bridges.*—The limitations imposed upon the extension and maintenance of roads and bridges by available equipment, referred to last year, were increased by man-power shortage, military operations, and civil defence needs, which made heavy demands upon the men normally engaged on these works and limited new construction to works essential to defence production and to forest-protection. Culverts and bridges have been constructed of creosoted exotic softwoods to demonstrate modern methods of design.

55. *Other Transport Facilities.*—As part of its station-yard development at Rotorua, the New Zealand Railways have provided a private siding to facilitate the handling of Department produce, which now amounts monthly to over 500,000 board feet of timber in the form of sawn timber or box shooks, and almost 80,000 cubic feet of timber in the form of poles, piles, props, posts, &c.

56. *Buildings.*—No major buildings have been built during the year, but four small houses constructed of exotic softwood have been added to the Waipa Mill Village. The extra accommodation required for workers engaged on the production of poles, piles, props, &c., at Waipa was provided by moving forestry camp hutments to the site of the single men's hostel, where catering facilities are already available.

Maintenance and improvement of buildings has been effected as opportunity has offered. The houses erected at the Waipa mill have been built as possible models for married forestry workers' accommodation, for which there will be heavy demands at the conclusion of hostilities. This development of accommodation suitable to forestry requirements is regarded as vital to departmental rehabilitation activities.

57. *Water-supply and Drainage.*—With the limited materials and man-power available little improvement in water-supply and drainage facilities has been possible, but to reduce the ever-present fire hazard in the box-factory at the Waipa State mill it has been arranged to install a modern automatic sprinkler system.

58. *Utilization Plants.*—The only major alteration to the plant at the Waipa mill was the installation of a mechanical log crosscut saw and conveyor for transferring logs to the sorting pond. Further experience in the operation of the mill demonstrates that only by the operation of this pond is it practical to reduce pumice wear on saw frame guides, &c., to a reasonable figure. The log frames have also proved adaptable to the sawing of crooked logs with a sweep in one plane, an advantage not possessed by any other type of sawing equipment.

The box-factory attached to the Waipa mill was finally completed during the year, for the latter part of which it has absorbed the whole of the mill output not required for other defence commitments. The key machines, a number of them the only ones of their kind either in Australia or New Zealand, have proved entirely suitable for the working-up of the exotic softwoods, and conversion processes are in course of development which it is hoped will revolutionize shook-manufacture.

The creosote-plants at Waipa, Hanmer Springs, and Conical Hills have been maintained and minor improvements effected.

59. *Transportation.*—No additions to the departmental motor-vehicle fleet have been made, and, as was the case last year, vehicles due for replacement have of necessity been repaired. Close supervision to ensure only essential running has been exercised by controlling officers. A tandem-axle pole-type logging-trailer, incorporating a North American axle assembly, was manufactured at the Waipa mill workshop and ranks as the best unit of its kind now operating in the Dominion. The transportation of manufactured produce from Waipa to railway has been improved by the use of detachable semi-trailers which reduce the idle time and increase the utility of available trucks.

Charcoal-burning producer-gas units have now been fitted to seven departmental trucks, while an eighth truck is operating with a unit mounted on a trailer. In co-operation with the Substitute Fuel Committee, a trailer-type charcoal-burning producer-gas unit for use with a passenger-car was developed and is now used with an inspectional car in the Wellington Conservancy.

60. *Communications.*—Fourteen miles of new telephone-line were erected, bringing the total to 385 miles. At Whakarewarewa Forest, Rotorua Conservancy, the remaining earthed circuit-line was converted to metallic, but the shortage of materials has restricted the progress of this work on other projects.

61. *Village Planning.*—A self-contained village similar to that envisaged for Kaingaroa Forest Headquarters is being planned for Waiotapu as a key project in the Department's rehabilitation activities, and all the necessary surveys are in progress

CHAPTER VIII.—EXTRACTION AND COMMERCIAL DEVELOPMENT.

62. *State Forest Block Sales and Permits.*—The number of appraisals decreased from 156 in 1940–41 to 123 in 1941–42, and the quantity of timber cruised from 134,200,000 board feet to 102,062,000 board feet. Twenty-two of the appraisals were for other Departments and covered 13,062,000 board feet. Six Head Office check appraisals were made over representative areas involving 9,700,000 board feet, in addition to regional checks by senior officers.

Although sawn timber was in keen demand, block sales show a decrease on the previous year, the quantity falling from 94,124,000 board feet to 80,637,000 board feet. The main species comprising the sales (in board feet) were rimu, 64,276,000; kahikatea, 4,631,000; miro, 2,412,000; matai, 3,770,000; totara, 1,070 000; beech, 3,715,000; kauri, 300,000; and others, 463,000, with a total value of £111,040.

The quantity of sawn timber produced from State forest and warden areas also decreased, the recorded cut being 108,858,000 board feet, as compared with 112,512,000 board feet in 1940–41.

Permits to cut indigenous fencing material, poles, railway-sleepers, firewood, and mining timbers were in good demand. Timber cut and sold under this form of license comprised 285,780 posts and stakes, 13,665 strainers, 5,525 stays, 221,570 battens, 2,269 poles, 3,106 pole blocks, 12,835 sleepers, 2,086 house blocks, and 59,046 pieces of mining timber. The forest produce cut under permit from exotic forests includes 7,050 posts and stakes and 67,970 pieces of mining timber.

63. *State Forest Log Sales.*—In the Auckland Conservancy indigenous log sales comprising kauri 35,350 cubic feet, rimu 98,615 cubic feet, kahikatea 57,516 cubic feet, totara 9,676 cubic feet, and matai 1,187 cubic feet, realized £8,049. In the Rotorua Conservancy rimu 503,048 cubic feet, kahikatea 166,363 cubic feet, matai 143,376 cubic feet, totara 15,719 cubic feet, and miro 7,918 cubic feet, a grand total of 836,424 cubic feet, were sold for £21,107, while 660 cubic feet of rimu and 22,776 cubic feet of kahikatea were sold for peeler logs. Salvage operations in the Rotorua worked-over areas produced 13,882 posts and strainers, 6,575 battens, and 70 cords of firewood.

Exotic logs aggregating 123,067 cubic feet, together with fencing material, firewood, and mining timber obtained from thinnings and windthrows were sold for £11,823, as compared with £6,248 from similar sales last year. Of these, Rotorua contributed 9,069 cubic feet of logs, 43,800 stakes, 14,100 pieces of mining timber, and 99 cords of firewood, valued at £1,582; and Nelson 48,660 stakes and 2 cords of firewood, valued at £1,433. Canterbury's quota included 2,998 cubic feet of logs, 39,948 posts, stakes, and rails, 90 poles, and 1,840 cords of firewood, valued at £4,496; and Southland's 111,000 cubic feet of logs, 24,557 stakes, 943 pieces of mining timber and 531 cords of firewood, valued at £4,313.

In addition, the Rotorua Conservancy produced articles for conversion into sawn timber, creosoted posts, poles, &c., and manufactured 1,040,874 cubic feet of logs, 5,582 poles, 123,053 posts and stakes, 1,638 strainers, 310 stays, 85,834 pit-props, 133,350 stakes and pickets, and 20 cords of firewood.

64. *Sale of Departmental manufactured Forest Produce.*—Departmental logging, milling, boxmaking, and wood-preservation activities have been operated as integral units of the timber industry, and made to conform to award conditions, to timber-control policy, and to Price Investigation Tribunal control, &c.

65. *Whakarewarewa Log-production.*—Round forest produce from the Whakarewarewa State Exotic Forest now includes pines, larch, and eucalypts. Logging operations in the usual sense are confined to the clear cutting of insignis pine and larch, although considerable quantities of round produce are secured from thinning operations. The insignis-pine logging is on heavy sidling country in which even main roads have ruling gradients of 1 in 10. Due to the average tree yielding only 200 board feet of logs averaging less than 11 in. in diameter, the cost of felling and delivery to mill skids is still 9s. per 100 board feet, including a payment to the Whakarewarewa Forest Account of 2s. 6d. per 100 board feet for royalty which is sufficient to pay off the accumulated charges against these compartments. Having regard to the small size of the logs, the total labour element in the logging-cost amounting to 4s. 3d. per 100 board feet compares favourably with figures from 3s. 6d. to 6s. commonly operating in private logging units in indigenous and exotic forests.

66. *Departmental Milling Operations.*—Departmental production of sawn timber concentrated in the Rotorua Conservancy totalled 7,053,000 board feet for the year, as compared with 5,491,000 board feet for the previous year. Sales for the two periods amounted to 4,092,000 and 3,411,000 board feet respectively. The year ended 31st March, 1942, represents the first complete year of operation for the Waipa log-frame mill, its production of 6,346,000 board feet representing three times as much as that of any other exotic-timber sawmill in the Dominion. The small portable Waiotapu mill, originally installed to cut timbers for the large Waipa mill buildings, ceased operations on the 31st October, having completed the salvage of timber from a compartment threatened with serious windthrow.

The Waipa sawmill costs from mill skids to green sorting chain amount to 6s. 6d. per 100 board feet, including a labour element of 4s. per 100 board feet, which compares favourably with sawmill labour-costs of between 4s. and 7s. in indigenous- and exotic-timber mills. The combined logging and milling labour-costs for Waipa amount to 8s. 3d. per 100 board feet, as compared with a range of between 7s. and 15s. in private indigenous and exotic operations.

The Department's commercial accounts showed a loss during the initial operating period ended 31st March, 1941, amounting to £4,249 (sawmill only). This was due to the usual operating difficulties experienced in the breaking-in of any new plant, particularly when operatives have to be trained to the use of equipment never previously employed in the country. For the year ended 31st March, 1942. The accounts show a profit of £4,397.

67. *Waipa Box Factory and Planing Mill.*—This factory only came into operation during the year. Although equipped to deal with the entire output of the Waipa log-frame mill, amounting for the period to 6,346,000 board feet, only 2,627,000 board feet was available for box-shook manufacture, the remaining timber being required by the Office of the Timber Controller for more essential purposes elsewhere. The principal items of manufacture included shooks for 240,000 cheese-crates, 42,000 barbed-wire reels, 25,000 fruit-cases, and 6,000 miscellaneous cases. The allocation of shooks for 240,000 cheese-crates made by the Office of the Timber Controller is regarded as unremunerative business, as many cheese-crate manufacturers operated at a loss on ruling prices, and this, combined with the high initial costs of starting up a new factory, resulted in a profit of only £1,111 on the year's trading,

68. *Departmental Wood-preserving Activities.*—In view of the serious shortage of fencing-posts and poles with high natural durability the three creosoting-plants at Rotorua, Hanmer, and Conical Hills were maintained in as continuous operation as practicable. As all timber for creosoting must be effectively seasoned before treatment, the poor drying conditions experienced during last spring and summer restricted operations materially, more particularly at the two South Island plants. Nevertheless, as disclosed by Appendix III, the volume of wood treated increased from 102,000 cubic feet for the year ended 31st March, 1941, to 157,000 cubic feet for the year under review, whilst the untreated stocks on hand at the end of these two periods were 126,000 and 183,000 cubic feet respectively. The sales trebled from 49,000 to 146,000 cubic feet, this latter figure including 136,000 fencing-posts.

The Department's commercial accounts showed a loss during the initial period ended 31st March, 1941, amounting to £6,337. This was due to the effort made to produce cheap posts in competition with indigenous split produce, but the high labour-costs involved in the peeling or barking of posts and the losses incurred through incipient decay of timber while seasoning preparatory to treatment resulted in the creosoted posts being sold at below cost of production.

While peeling-costs have since been reduced and post-selling prices advanced to £16 5s. f.o.r. Rotorua for Size 1 and to £11 15s. f.o.r. Rotorua for Size 2, these still appear to be insufficient to return an adequate profit, that on the year's trading amounting to only £239. In contrast, creosoted poles command a good profit; and in view of the fact that as much plant-capacity as possible is now required for the creosoting of poles for essential war purposes it is anticipated that the next year's trading will show a profit.

69. *Departmental Participation in Trade.*—The purpose of departmental participation in the timber trade cannot be too often restated. The Forest Service is faced with the development of a man-made exotic-forest resource already totalling over 440,000 acres and costing over £5,958,650. No experience whatsoever was available to it either in New Zealand or elsewhere as to how and when logging and milling operations, &c., could be undertaken in these softwood forests and what products could be manufactured, and it was imperative that both equipment and operating technique should be developed well ahead of any large expansion in exotic-softwood demand. It was for this reason that the Waipa group of logging, milling, box-factory, and wood-preservation plants have been developed on the Whakarewarewa State Forest of 8,000 acres, and the experience already gained is of far-reaching importance. The necessity for silvicultural or improvement cuttings at appropriate times has been amply demonstrated, the limitations of plant and equipment determined, the practicability of precision manufacture, and of anti-sapstain treatment established, and the high utility of the timber and its manufactured products duly proven. Further experience will decide the practicability of re-establishing the forest by natural regeneration, and allow the development of further refinements in manufacturing technique. Varied as these questions appear, all are directed towards the major objective of reducing both forest-growing and timber-manufacturing costs to an absolute minimum so that the public may receive its timber supplies at the lowest possible price.

CHAPTER IX.—THE TIMBER TRADE.

70. Annual *Dominion Production of Sawn Timber.*—As reported by the Government Statistician the annual cut for the year ended 31st March proved to be 342,000,000 board feet, as compared with an estimated cut of 340,000,000 board feet. The estimated cut for the year ended 31st March, 1942, is 310,000,000 board feet, the reduction being due to the withdrawal of men from the industry for the armed Services.

71. *Species cut.*—The distribution of production by species and districts for the year ended 31st March, 1941, is scheduled in Appendix VII, the outstanding figure of which is the increase in insignis-pine production to 53,000,000 board feet, representing almost one-sixth of the country's total timber production.

72. *Man-power Survey.*—Owing to a serious decline in production during the July–September quarter of 1941, a man-power survey of the timber industry was undertaken in October, as a result of which it developed that of its normal complement of 6,700 the industry had lost 1,800 to the armed Services, but had gained 900 from other industries and occupations, giving a working complement of 5,800, or about 86 per cent. of normal.

73. *Equipment for Timber and Allied Industries.*—As a result of continued supply and shipping difficulties, few units in either the sawmilling or boxmaking sections of the industry found it possible to secure delivery of new equipment except in the case of relatively small machines, and increasing competition for second-hand equipment has been strongly in evidence. To conserve petrol and tires, schemes are being developed for the establishment and reinstatement of forest and timber tramways, particularly those which may be made to serve a number of sawmills.

The new plywood factory established by Messrs. N.Z. Plywoods, Ltd., and the Pinex structural fibre board factory erected by Messrs N.Z. Forest Products, Ltd., both at Auckland, are now virtually in full production and relieving the acute shortage of plywood and fibre board resulting from reduced imports.

74. *Domestic Markets.*—The demand for building timbers continued in excess of supply throughout the whole year, and to meet even that for the more important work it was necessary to draw heavily upon stocks both at mills and in merchants' yards until the entry of Japan into the war, supplies of the higher grades were reserved for the building trade, since when, however, the whole production has

been absorbed on essential defence works. Not unexpectedly, the number of permits for domestic buildings reported by the Government Statistician for the year ended 31st March, 1942, was only 4,565, as compared with 6,011 for the previous year. The increased production of insignis pine failed to meet the country's general boxmaking requirements, and the deficiency was filled with rimu and matai.

Prices of timber and timber products were maintained under strict control by the Price Tribunal. To cover increased costs resulting from the new award and the general cost-of-living bonus price-advances were approved which averaged less than 4 per cent. on previous levels.

75. *Timber Imports.*—The Customs returns scheduled in Appendix IV show a total import trade of 22,000,000 board feet for the calendar year 1941, as compared with 15,000,000 board feet for 1940, Australian hardwoods alone increasing from 12,000,000 to 18,000,000 board feet, all of which, however, was of an essential character.

76. *Timber Exports.*—According to Appendix V, Customs returns show a total export of 16,700,000 board feet for the calendar year 1941, as compared with 17,400,000 board feet for 1940. Owing to heavy domestic demands, exports of beech, matai, kauri, and insignis pine were reduced on the previous year's figures, although slightly increased quantities of white-pine, rimu, and other timbers were released. As far as it is practicable, New Zealand and Australia are endeavouring to protect each other's requirements for essential timbers not produced in their own territories.

CHAPTER X.—UTILIZATION.

77. *General.*—All previous conceptions of wood usage have required universal modification under the impact of war conditions. So unprecedented has been the shortage of timber that consumers have willingly accepted whatever substitutes have been available, often with results much more successful than anticipated. Expansion in the local production of plywood, structural insulating board, and pulp-board products has offset the cessation of overseas supplies.

78. *Hardwood Grading.*—The increasing use of silver-beech for the manufacture of essential munitions, &c., has demonstrated the impracticability of existing grading rules, and, in co-operation with the wartime Beech Marketing Authority, a new set of rules is in course of development not only for beech, but also for tawa and other hardwoods.

79. *Timber Profiles.*—Due to pressure of timber-control activities, only limited progress has been possible with the standardization of profiles for weatherboarding, flooring, and linings, but additional data is being collected and field studies initiated to establish the maximum finished widths and thicknesses which can be adopted for such profiles.

80. *Structural Grading.*—The expanded use of heavy structural timbers for war purposes has yielded further experience of value in the drafting of structural grading rules and the derivation of working-stresses.

81. *Mill Studies.*—At two mills in each of the Auckland and Nelson Conservancies the conversion of indigenous logs into sawn timber was studied, and similarly that of insignis pine in one mill each in the Wellington and Nelson Conservancies. In these latter studies, both of which were made on logs from forty-year-old trees, the bark content was 11 per cent. The New Zealand Railways were also assisted in their investigations into log-measuring practices for freight charging.

82. *Utilization of Minor Species.*—With the cessation of Japanese oak imports and reduced supplies of Australian hardwoods, considerable interest has developed in the possibility of using tawa, taraire, mangeao, and other indigenous hardwoods as substitutes. Tawa as the most plentiful and widely distributed species is being cut in increasing quantities for finishing, interior fitments, and furniture, and some 15,000 board feet were kiln-dried at the Waipa mill to demonstrate the practicability of kiln-drying 1 in. and 2 in. stock green from the saw. The results have been excellent, and a number of office desks of modern design have been constructed to bring out effectively the attractive grain of the wood. Before assembly, the parts were treated with the Department's recommended furniture-wood preservative consisting of pentachlorphenol in a solution of petroleum oil. This preservative causes no swelling or subsequent shrinkage and provides a perfect protection against the powder-post beetles (Lyctus spp.) so common in oak furniture and which hitherto have been a serious menace to tawa. The successful kiln-drying of tawa and the treatment of furniture parts before assembly now allows the trade to develop the use of this timber as a first-class substitute for oak.

83. *Timber Mechanics.*—During the year 1,143 standard tests were made, covering the principal mechanical properties of Samoan-grown teak, Fijian kauri, European larch, and insignis pine. The results show that Pacific-grown teak and kauri possess strength properties similar to Burmese teak and New Zealand kauri respectively, and may be largely used as substitutes for these timbers. The larch available for study yielded only a small number of clear specimens suitable for standard tests, but additional specimens containing pin-knots were tested for use as cross-arms. The result of the insignis-pine tests indicate that it will be entirely practicable to develop working-stresses and structural grading rules based upon ring counts and springwood percentages.

84. *Box-testing.*—Specifications for numerous containers for munitions and foodstuffs for the armed forces were developed and are in extensive use. Rimu has proved much more valuable than expected as a substitute for the lighter and more easily-worked softwoods, such as kahikatea, insignis pine, &c.

85. *Microscopic Anatomy of Woods.*—In addition to routine identification work for Government Departments and other interests, the only studies undertaken have been in connection with silvicultural and timber-testing work.

86. *Specific-gravity Studies.*—Exotic forest sample plot studies have continued to supply material for specific-gravity determinations from Rotorua Conservancy, principally in the case of *P. radiata*. Other specific-gravity samples of various minor species and of slow-grown *P. radiata* from Central Otago, and eucalypt timber from North Auckland, have also been tested. In conjunction with the tests of mechanical properties, the standard specific gravity and shrinkage tests have also been carried out.

87. *Electric Moisture Meters.*—The continued use of these meters has demonstrated their utility for routine control of box-factory and drying operations. Studies are being made of their possibilities as a means of testing the moisture content of tree-seed.

88. *Kiln-drying.*—Assistance has been given to operators of drying-kilns throughout New Zealand in the solution of numerous problems. As a result of further experience in the drying of tawa and silver beech, regular kiln-drying schedules for these timbers are now available to the trade.

89. *Wood-preservation.*—The use of sapstain-preventive chemicals initiated by the Service last year on a commercial scale at the Waipa mill has entirely proved its usefulness in maintaining exotic softwoods in a bright, clean state under even the worst conditions of drying, and increasing quantities are being used by commercial firms. Pentachlorphenol in a petroleum and pine oil mixture is likewise finding increasing use for the treatment of building timbers *in situ* and of finished furniture parts. Its peculiar property of not causing any swelling or subsequent shrinkage of the wood or of affecting its staining and polishing properties makes it an ideal preservative for this latter purpose, since all concealed joints are as well treated as exposed parts. In view of the difficulty of procuring further supplies from the United States of America due to war requirements in that country, investigations are being made into the possibilities of Australian-produced substitutes.

For testing the efficiency of priming-coats in the painting of exotic-pine timbers a paint-test fence is being erected at Wallaceville. To the wooden framework already in position painted panels are to be attached; rimu controls will be used. Collaboration has continued with the Inter-departmental Paint Committee.

90. *Derived Products.*—A large-scale study of cordwood volume measurement was also initiated, and stacking methods investigated with a view to controlling sapstaining in pulpwood by (*a*) spray treatments with sapstain preventives, (*b*) open-layer stacking after barking, and (*c*) the retention of bark. Seasonal variation in ether-soluble-resin content of freshly-cut samples of insignis pine and the change in this resin when wood is stacked in 4 ft. and 8 ft. cordwood is being studied in collaboration with the Dominion Laboratory.

91. *Charcoal and Gas Producers.*—The demand for charcoal was not brisk as cheaper Waikato "char" was sufficient to meet the requirements of the majority of the gas-producer units in operation. Thus for the greater part of the year production was carried on only at Rotorua, where charcoal was manufactured principally from eucalypts for use in the producer-gas units fitted to departmental trucks. Shortly after Japan's entry into the war, however, it was deemed advisable to build up stocks of charcoal to meet increased demands, and production was expanded at Rotorua, Taringamotu, and Nelson (Golden Downs). At Golden Downs experimental burning in brick-lined and steel-sheet-lined pits produced beech charcoal of a satisfactory quality, but further experience with departmental producer-gas vehicles has established beyond all possible doubt the superiority of manuka to any other local charcoal used.

During the year, 65 tons of charcoal were produced; sales amounted to 39 tons, with stocks at the end of the period standing at 49 tons. A small but regular demand has developed for various grades of fines and powder for poultry feed, &c.

In co-operation with the Dominion Laboratory and the Substitute Fuel Committee, an effort is being made to develop a gas-producer unit which will use wood blocks directly and so avoid their costly conversion into charcoal.

CHAPTER XI.—MISCELLANEOUS.

92. *Legislation.*—Amendments to the Forests Act, 1921–22, are contained in sections 26 to 29 inclusive of the Statutes Amendment Act, 1941. An amendment to section 45 empowers a Forest Officer to require any person within a fire district or within a radius of five miles of an outbreak of fire to assist in its control and suppression. Further amendments extend the provisions of section 63 of the Act, and include the power to make regulations to regulate or prohibit traffic into, in, or through State forests, to authorize Forest Officers to prohibit or regulate the use of any public road adjoining a State forest or within a fire district while fire-fighting operations are proceeding, to prescribe measures and equipment to be provided by sawmillers and other persons engaged in industrial operations in State forests and fire districts for the prevention and suppression of fire, to establish and conduct recreational and camping areas in State forests, and to eradicate or prevent the spread of any disease which may affect trees or timber, whether such disease is caused by or consisting of the presence of any insects, fungi, bacteria, or viruses. This regulation does not affect the provisions of the Orchard and Garden Diseases Act, 1928.

Section 3 of the Reserves and other Lands Disposal Act, 1941, cancels the provisional State forest reservation over Section 9, Block VIII, Waimea Survey District, Nelson Land District, reserves the land for water-supply purposes, and vests it in the Corporation of the City of Nelson.

93. *Finance.*—A summary showing receipts and payments from State Forests Account for the past year, together with comparative figures for the previous three years, is presented in Appendix VI. Complete departmental accounts appear in parliamentary paper B.–1 [Pt. IV].

Expenditure for the year decreased approximately £60,000, mainly because of reduced personnel on managed forests. Another item is the reduction of approximately £12,000 under "Utilization" owing to the change over from construction to operating conditions. The revenue increased by nearly £79,000, largely due to the output of the utilization plant—*i.e.*, sales of sawn timber, box-shooks, creosoted products, &c.

94. *Subventions to Local Bodies, &c.*—Last year attention was drawn to the subventions of State-forest revenue to local bodies and to the Consolidated Fund, and the extent of this tax on forest finance will be gathered by perusing the appended figures for the past four years:—

Year.	Consolidated Fund (under Section 39 of Forests Act, 1921–22).	Local Authorities (under Section 17 of Finance Act, 1924).	Local Authorities (under Sections 6–7 of Forests Amendment Act, 1926–27).	Total.
	£	£	£	£
1938–39 ..	18,712	14,191	5,825	38,728
1939–40 ..	14,416	13,202	8,278	35,896
1940–41 ..	16,151	16,593	7,075	39,819
1941–42 ..	20,443	17,080	8,261	45,784
Totals ..	69,722	61,066	29,439	160,227

95. *Recreation in State Forests.*—The shortage of motor-tires, restrictions on the use of petrol, and the extended hours of industry have greatly reduced the number of visitors to State forests, and it is obvious that with a continuance of war conditions the numbers will decline still further. The recently granted authority to establish and conduct recreational and camping areas in State forests is unlikely to be much exercised until hostilities have ceased.

96. *Mining Privileges.*—Applications under this head show an increase from 133 in 1940–41 to 174 for the year under review. Four applications for coal-mining rights under the Coal-mines Act, 1925, were also dealt with.

97. *Grazing Leases.*—Temporary grazing leases and licenses numbered 202, the same as last year. Five new licenses were granted and 5 surrendered.

98. *Rehabilitation.*—The principal activity during the year has been a further search for lands suitable for—

(*a*) The establishment of local exotic forests in major farming districts; and
(*b*) The creation of indigenous-forest-management areas upon which extensive silvicultural and improvement projects may be initiated.

99. *Office of Timber Controller.*—A policy of service to and co-operation and negotiation with both the New Zealand Timber Workers' Union and the Dominion Federated Sawmillers' Association has resulted in a war effort by the timber trade which is believed not be be exceeded by any other industry. Both national and local secretaries of the two organizations have made production their major concern, and their achievement with the man-power available is one with which the Forest Service is proud to be associated. Timber-control duties have become the principal work of most controlling and senior officers of the Department.

100. *Timber Control Notices.*—The following notices issued during the year under the Timber Emergency Regulations 1939 are, with the exception of (*c*) hereunder, still in force:—

(*a*) The Southland and Otago Silver-beech Marketing Notice 1940, Amendment No. 1 (Serial number 1941/102), is a machinery amendment of the principal notice (Serial number 1940/318).
(*b*) The Removal and Erection of Sawmills Notice 1941 (Serial Number 1941/236) provides that on and from the 19th December, 1941, no person may remove a sawmill to another site or erect a sawmill without the precedent consent of the Timber Controller. Its purpose is to facilitate the concentration of available man-power in the fewest and best-situated mills.
(*c*) Timber Control Notices Nos. 31 and 32, published in *Gazette*, 1941, page 3913, required returns of stocks of wire ropes, saws, corrugated fasteners, and binding-wire to be furnished by sawmillers and boxmakers. Both were transitory and are now spent.
(*d*) Timber Control Notice No. 33, published in *Gazette*, 1941, page 3959, was introduced to conserve binding-wire for essential purposes.
(*e*) Timber Control Notice No. 34, published in *Gazette*, 1942, page 371, was issued to ensure adequate supplies of Building A and Dressing A matai for the manufacture of cheese-crate battens.
(*f*) Timber Control Notice No. 35, published in *Gazette*, 1942, page 609, requires beech timbers to be correctly designated both by species and by the district in which they were grown, its purpose being to ensure the delivery of true-to-name timber for munitions work both in New Zealand and elsewhere.
(*g*) Timber Control Notice No. 36, published in *Gazette*, 1942, page 609, prohibits the cutting, sale, or purchase of Australian hardwoods for other than specified purposes except with the precedent consent of the Timber Controller, and also requires certain returns to be furnished. Both supply and shipping difficulties have made it imperative to conserve supplies.
(*h*) Timber Control Notice No. 37, published in *Gazette*, 1942, page 610, prohibits the cutting of 6 in. by 6 in. or larger oregon or Douglas fir timber except with precedent consent. This was necessary to conserve stocks of large-dimensioned timbers for structural purposes.
(*i*) Timber Control Notice No. 38, published in *Gazette*, 1942, page 610, provides that insignis-pine timber shall not be cut and used for other than wooden containers except with the precedent consent of the Timber Controller.
(*j*) Timber Control Notice No. 40, dated 20th March, 1942, was not published, but given to each sawmiller; it requires a monthly return of timber stocks and the position of any defence or emergency orders.
(*k*) Timber Control Notice No. 42, dated 25th March, 1942, was not published, but was given to each timber-merchant; it likewise requires a monthly return of timber stocks and the position of any defence or emergency orders.
(*l*) The Second-hand Fruit-case Control Notice 1942, published in *Gazette*, 1942, page 642, and the statutory Regulations, Serial number 1942/120, limits the reuse of apple and pear cases for the packing of such fruit by requiring their sale in specified cities, boroughs, and town districts, to fruitgrowers, their representative organizations, fruit-packers, or persons engaged in reconditioning fruit-cases except with the precedent consent of a District Manager of the Internal Marketing Division of the Marketing Department (as delegate of the Timber Controller). The operation of this notice is extended by Amendment No. 1, Statutory Regulation, Serial number 1942/121.

(*m*) Timber Control Notice No. 43, published in *Gazette*, 1942, page 952, provides briefly that timber produced in or south of Te Kuiti, shall not be transferred to the north of Te Kuiti except with precedent consent. This arrangement was necessary in order to provide adequate supplies for the Taranaki, Hawke's Bay, and Wellington Provincial Districts.

(*n*) On the 26th March, 1942, by agreement with the New Zealand Timber Workers' Union and the Dominion Federated Sawmillers' Association, formal notice was given to certain sawmillers tributary to the North Island railway system to increase production by extending the hours of working until further notice to at least forty-eight hours each week, except with the precedent consent of the Timber Controller.

101. *Declaration of Timber Industry as Essential.*—Faced with an ever-increasing demand for timber for defence and munitions and a declining personnel in the industry, the Minister of National Service made the following declarations in terms of Regulation 9 of the National Service Emergency Regulations 1940:—

(*a*) Declaration of Essential Industry (No. 7), dated 16th January, 1942, published in *Gazette* 1942, page 354. The industry of sawmilling, including Government undertakings therein, also operations engaged in the supply of logs.

(*b*) Declaration of Essential Undertakings (No. 22), dated 16th January, 1942, published in *Gazette*, 1942, page 356. Specified concerns in respect only of the manufacture of wooden boxes, containers, and parts thereof.

(*c*) Declaration of Essential Undertakings (No. 22) is amended by notice dated 31st January, 1942, published in *Gazette*, 1942, page 457, by deleting specified concerns.

(*d*) Declaration of Essential Undertakings (No. 22) is further amended by notice dated 27th February, 1942, published in *Gazette*, 1942, page 633, by deleting specified concerns.

(*e*) Declaration of Essential Undertakings (No. 22) is further amended by notice dated 19th March, 1942, published in *Gazette*, 1942, page 911, by deleting a specified concern.

102. *Industrial Man-power.*—By arrangement with the National Service Department, the Forest Service has investigated the man-power position in all mills, and, wherever justified, the office of the Timber Controller has supported appeals in the public interest. With the entry of Japan and America into the war, timber requirements for defence works, &c., have expanded to such an extent that, in addition to the working of extended hours, it will shortly be necessary to ask for (*a*) the transfer of workers with previous experience in the timber industry from less essential occupations, and (*b*) the release from military service of all experienced bushmen and of most sawmill workers.

103. *Vehicle and Tractor Impressment and Petrol and Tire Conservation.*—To increase production and at the same time conserve petrol and tires, the Forest Service has acted in an advisory and law-enforcement capacity to the Commissioner of Transport and Oil Fuel Controller. By heavier load-limits, increased use of railage facilities, and reduced use of supervisory and non-essential vehicles, substantial savings in both petrol and tires have been effected. The Army, together with the Public Works Department and the Transport Department, have co-operated to leave with the industry its essential requirements in logging tractors and timber vehicles.

104. *Essential Supplies.*—The action of the Department in arranging for national reserves of wire ropes, saws, and corrugated fasteners has been vindicated by the narrow margin by which serious shortages in these supplies have been averted, and extension of the scheme to other supplies is under consideration.

105. *Forest Resources.*—The maintenance of adequate log-supplies to existing mills has become increasingly difficult. The most accessible forest resources are often held by owners who are reluctant to sell either for sentimental or other reasons, but fortunately all those required to date have been released as a contribution to the war effort. Nevertheless, it has been necessary in other cases in order to expedite sales and to avoid closing down of mills engaged on the cutting of timber for essential defence works to direct the owners to make timber immediately available for cutting without waiting for the normal completion of agreements.

106. *Export Butter-box and Cheese-crate Pools.*—Under the Export Butter-box and Cheese-crate Pool Regulations 1941 the pool system of purchase and distribution of dairy-produce containers was extended to include cheese-crates as well as butter-boxes. While the butter-box section of the regulations continued to apply to the North Island only, the cheese-crate section embraced the whole Dominion; the State Forest Service co-operated with the New Zealand Dairy Board in the purchase and disposal of both types of containers.

Due to the change-over from butter to cheese manufacture and also to a poorer dairying season than last year, the number of export butter-boxes manufactured was only 4,679,000, compared with 5,300,000 for the previous period. Of the season's total 4,146,000 were made of white-pine and 533,000 of rimu. A total of 20,953,000 board feet of timber was delivered to factories for box-manufacture—8,630,000 board feet of white-pine from North Island sawmills and 9,794,000 board feet of white-pine and 2,521,000 board feet of rimu from the South Island. The demand for cheese-crates was a record for the Dominion, and for the eight months ended 31st March, 1942, dairy-factories absorbed 1,868,000 export cheese crates—211,000 in the South Island and 1,657,000 in the North Island. Under wartime conditions the supply of timber for such quantities was often very difficult, but by careful and continuous control the period of peak demand was successfully met.

107. *Commercial Afforestation Companies.*—Figures supplied by the Government Statistician show that the total planted area controlled by private companies at 31st March, 1941, was 310,542 acres; the new planted areas actually totalled 531 acres, but owing to an adjustment of figures the net increase on the total quoted last year is only 101 acres.

APPENDIX I.

AREAS OF STATE FOREST AS AT 31ST MARCH, 1942.

Conservancy.	Permanent State Forest.		Provisional State Forest.		Totals.	Percentage of Land Area under State Forest Reservation.
	Ordinary.	National Endowment.	Ordinary.	National Endowment.		
	Acres.	Acres.	Acres.	Acres.	Acres.	
Auckland ..	389,519	89,789	130,196	14,006	623,510	7·25
Rotorua ..	631,850	289,939	136,319	63,108	1,121,216	14·19
Wellington ..	986,870	37,308	27,463	7,634	1,059,275	8·75
Nelson	762,818	179,945	886,093	583,109	2,411,965	34·42
Westland ..	916,914	354,109	360,718	230,622	1,862,363	48·20
Canterbury ..	486,361	3,647	..	..	490,008	4·91
Southland ..	529,957	56,234	633,901	13,740	1,233,832	7·27
Totals as at 31st March, 1942	4,704,289	1,010,971	2,174,690	912,219	8,802,169	13·26

APPENDIX II.

SUMMARY OF PLANTING AND SILVICULTURAL OPERATIONS IN STATE FORESTS AS AT 31ST MARCH, 1942.

Project.	Year of Commencement.	Gross Area of Forest.	Total Net Area planted.	New Area planted, 1941–42.	Area pruned, 1941–42.	Area thinned, 1941–42.	Area clear-felled, 1941–42.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Mangonui	*	8,927	..	..	..	..	..
Waipoua	1925	12,600	3,293	520	86	1	..
Puhipuhi	1904	1,565	1,209	..	93	93	3
Riverhead	1926	11,965	10,593	2	150	..	..
Tairua	1930	48,510	13,379	296	44	1	..
Kauaeranga	1940	4,000	446	170	..	..	..
Maramarua	1928	14,087	12,311	..	244	..	..
Rotoehu	1937	31,235	4,297	707	..	..	..
Whakarewarewa ..	1898	10,065	7,822	16	174	289	143
Waiotapu	1901	7,974	6,983	..	182	132	21
Kaingaroa	1913	328,667	258,968	..	952	14	..
Tongariro	1937	4,500	2,242	380	..	..	..
Erua ..	1930	6,648	4,305	..	..	..	..
Karioi	1927	33,689	17,195	..	179	..	..
Masterton	*	1,718	..	..	..	..	..
Golden Downs ..	1927	28,799	22,128	908	279	182	..
Westland	1922	5,839	3,090	..	63	..	..
Hanmer	1901	10,372	7,684	..	27	119	..
Balmoral	1916	24,141	21,264	..	207	..	..
Eyrewell	1928	19,266	17,220	..	691	..	..
Ashley	1939	5,001	1,237	338	..	..	..
Naseby	1900	4,032	3,098	..	128	73	..
Dusky	1898	6,866	4,456	12	166	195	..
Conical Hills	1903	3,906	3,605	8	173	214	..
Pukerau	1915	628	565	..	..	..	..
Blue Mountains ..	1925	10,058	8,872	..	514	127	..
Pebbly Hills	1930	5,330	4,341	..	355	..	..
Minor Areas ..	1875–1939	14,342	2,678	565	210	46	..
Total	..	664,730	443,281	3,922†	4,917‡	1,486	167

* New projects. † Includes 3,399 acres of exotics on open land and 516 acres of exotic and 7 acres of totara interplanted in indigenous forest. ‡ Includes 4,888 acres on exotic and 29 acres on indigenous forest.

APPENDIX III.

Creosoted Forest Produce.

—	Year ended 31st March, 1941.				Year ended 31st March, 1942.			
	Posts and Strainers.	Poles.	Other Creosoted Produce.	Total Quantity of Creosoted Produce.	Posts and Strainers.	Poles.	Other Creosoted Produce.	Total Quantity of Creosoted Produce.
	Number.	Number.	Cu. ft.	Cu. ft.	Number.	Number.	Cu. ft.	Cu. ft.
Produce creosoted ..	81,029	4,576	14,361	102,211	107,906	4,366	30,040	156,559
Sales	50,294	1,815	1,456	48,574	135,903	2,594	4,441	146,051
Creosoted produce used by Forest Service	8,745	1,508	6,765	20,678	5,583	918	11,163	20,369
Creosoted stocks at end of year	55,665	1,742	6,617	63,527	11,172	2,598	9,481	42,803
Untreated stocks at end of year	98,810	6,040	6,438	126,420	124,517	8,087	13,352	182,935
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.
Creosote used	95,742	22,185	35,361	153,287	125,336	16,759	16,112	157,207

APPENDIX IV.

Imports of Sawn Timber and other Forest Produce.

(From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1939–41. Value represents value in country of export, plus 10 per cent. expressed in terms of New Zealand currency.)

Item.	1939.		1940.		1941.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Hardwoods—	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
Australian hardwoods ..	30,840,000	456,600	10,782,000	172,100	17,020,000	260,800
Oak	2,512,000	53,100	1,195,000	63,000	890,000	21,300
Total	33,352,000	509,700	11,977,000	235,100	17,910,000	282,100
Softwoods—						
Douglas fir	5,237,000	41,800	1,820,000	23,800	2,121,000	24,000
Butter-boxes	..	..	..	..	..	..
Redwood	3,788,000	68,700	961,000	20,500	1,528,000	35,500
Total	9,025,000	110,500	2,781,000	44,300	3,649,000	59,500
Other	1,160,000	18,700	271,000	19,200	255,000	13,400
Grand total ..	43,537,000	638,900	15,029,000	298,600	21,814,000	355,000
Shingles, &c.	..	2,752	..	31	..	91
	Tons.		Tons.		Tons.	
Tanning-bark	922	10,555	765	7,314	867	13,006
Wood-pulp	6,220	50,647	7,090	142,729	7,780	169,301

APPENDIX V.

EXPORTS OF SAWN TIMBER AND OTHER FOREST PRODUCE.

From information supplied by the Comptroller of Customs. All figures refer to the years ended 31st December, 1939–41.)

Item.	1939.		1940.		1941.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ft. b.m.	£	Ft. b.m.	£	Ft. b.m.	£
White-pine	3,137,000	40,500	732,000	8,000	835,000	8,200
Rimu	6,673,000	63,900	11,931,000	112,000	12,167,000	141,700
Beech	1,258,000	13,400	1,575,000	20,600	808,000	11,400
Matai	241,000	2,400	994,000	13,200	180,000	2,100
Kauri	303,000	11,300	174,000	6,900	49,000	2,100
Insignis pine	1,222,000	18,700	1,889,000	33,100	1,578,000	29,300
Other New Zealand ..	86,000	900	29,000	600	1,092,000	15,100
Foreign	167,000	1,100	84,000	1,000	..	..
Total	13,087,000	152,200	17,408,000	195,400	16,709,000	209,900
	Tons.		Tons.		Tons.	
Kauri-gum	2,385	111,901	1,683	87,450	1,421	88,643
Tanning-bark	1	15	..	..	..	..
Fungus	28	3,724	22	2,377	24	2,911

APPENDIX VI.

PAYMENTS AND RECEIPTS FOR THE YEAR ENDED 31ST MARCH, 1942.

Item.	1941–42.	1940–41.	1939–40.	1938–39.
Payments.				
Allocation of revenue—	£	£	£	£
Consolidated Fund (portion of revenue from national-endowment forests)	20,442	16,151	14,416	18,712
Local bodies	17,080	16,593	15,612	12,566
General management charges—				
Salaries	81,662	77,834	70,858	63,422
General expenses	28,463	31,070	27,168	28,067
Land purchase	1 996	6,788	1,884	8,901
Forestry projects under direct management—				
Eotic	183,561	234,704	293,884	214,721
Indigenous	35,376	32,724	29,578	22,629
Utilization: Sawmill, creosote plant, &c. ..	136,090	148,545	120,344	52,777
Miscellaneous: Expenses of raising loans and interest on temporary advances	978	911	..	278
Totals	505,648	565,320	573,744	422,073
Receipts.				
Indigenous forests receipts—				
Timber sales	127,926	120,753	102,957	114,609
Timber royalties and trespass	9,532	8,539	12,130	11,292
Leases, grazing	1,523	1,558	1,618	1,498
Sawmill-sites, industrial, &c.	329	402	401	390
Miscellaneous	8,274	6,937	10,414	7,362
Log sales from managed forests	31,296	26,153	21,662	6,584
Exotic forests: Poles, posts, firewood, &c. ..	15,341	13,207	10,518	11,225
Utilization projects—				
Sawn timber	45,815	28,948	342	..
Creosoted products	19,262	7,996	314	46
Box shooks	32,883	..	..	..
Miscellaneous	3,642	2,470	282	731
Totals	295,823	216,963	160,638	153,737
Receipts from national-endowment indigenous forests (included in above)	45,374	27,408	22,114	20,085

APPENDIX VIII.

STATISTICS OF SAWMILLING AND SASH AND DOOR MANUFACTURING.

(Reprinted by arrangement with the Government Statistician from the Statistical Report on Factory and Building Production for the Year 1940–41.)

Sawmilling and Sash and Door Manufacturing, 1940–41.

Provincial District.	Number of Mills or Establishments.	Character of Organization.					Persons engaged in connection with													
							Felling, Hauling, &c.						Production of Sawn Timber from Logs.							
		Individual.	Partnership.	Registered Company.		Co-operative and Miscellaneous.	Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, Salesmen, &c.	Wage-earners.	Contract.	Total.	Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, Salesmen, &c.		Wage-earners.	Contract.	Total.	
				Public.	Private.		M.	M.	M.	M.	M.	M.	M.	M.	M.	F.	M.	M.	M.	F.
Auckland	146	32	27	26	61	..	13	19	3	541	165	741	45	87	69	18	1,180	47	1,428	18
Hawke's Bay ..	22	4	4	2	12	..	..	3	..	63	12	78	8	11	4	1	123	..	146	1
Taranaki	27	5	1	6	13	2	1	2	..	182	39	224	4	15	9	..	254	12	294	..
Wellington	65	10	7	5	42	1	3	13	..	299	36	351	10	27	14	7	415	21	487	7
Marlborough	8	3	4	..	1	..	2	..	..	17	2	21	3	2	1	..	17	..	23	..
Nelson	58	9	14	1	34	..	13	8	1	288	23	333	12	28	3	1	303	3	349	1
Westland	34	2	6	1	25	..	3	11	2	362	39	417	7	20	18	1	443	5	493	1
Canterbury	39	10	7	2	20	..	2	1	..	40	4	47	14	7	6	1	140	..	167	1
Otago—																				
Otago portion ..	26	7	4	3	12	..	6	3	..	55	1	65	8	7	2	..	66	..	83	..
Southland portion ..	42	6	5	2	29	..	5	6	..	222	8	241	9	21	9	7	261	..	300	7
Totals, 1940–41 ..	467	88	79	48	249	3	48	66	6	2,069	329	2,518	120	225	135	36	3,202	88	3,770	36
„ 1939–40 ..	461	83	85	45	245	3	55	70	10	2,174	349	2,658	107	196	141	25	3,125	136	3,705	25
„ 1938–39 ..	444	87	85	43	226	3	55	74	9	2,026	252	2,416	105	178	133	31	3,097	59	3,572	31

Provincial District.	Persons engaged in connection with														Salaries and Wages paid to Persons engaged in connection with						
	Resawing, Dressing, &c.								Total.								Felling, Hauling, &c.	Production of Sawn Timber from Logs.		Resawing, Dressing, &c.		Total.	
	Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, Salesmen, &c.		Wage-earners.	Contract.	Total.		Proprietors actively engaged.	Managers, Overseers, &c.	Accountants, Clerks, Salesmen, &c.		Wage-earners.	Contract.	Total.								
	M.	M.	M.	F.	M.	M.	M.	F.	M.	M.	M.	F.	M.	M.	M.	F.	M.	M.	F.	M.	F.	M.	F.
																	£	£	£	£	£	£	£
Auckland	8	52	45	20	757	..	862	20	66	158	117	38	2,478	212	3,031	38	210,626	391,649	2,254	230,300	3,165	832,575	5,419
Hawke's Bay ..	1	4	7	1	46	..	58	1	9	18	11	2	232	12	282	2	19,464	40,295	247	16,223	84	75,982	331
Taranaki	1	10	7	6	163	..	181	6	6	27	16	6	599	51	699	6	63,600	82,156	..	47,623	734	193,379	734
Wellington	4	18	21	9	319	1	363	9	17	58	35	16	1,033	58	1,201	16	96,341	133,974	1,025	94,379	1,217	324,694	2,242
Marlborough ..	1	..	..	..	1	..	2	..	6	2	1	..	35	2	46	..	5,314	6,619	..	514	..	12,447	..
Nelson	3	5	2	5	66	..	76	5	28	41	6	6	657	26	758	6	89,427	97,859	120	17,003	574	204,289	694
Westland	..	1	..	..	6	..	7	..	10	32	20	1	811	44	917	1	123,517	139,038	150	1,576	..	264,131	150
Canterbury	3	17	18	9	234	1	273	9	19	25	24	10	414	5	487	10	11,814	33,913	..	71,210	1,806	116,937	1,806
Otago—																							
Otago portion ..	1	7	12	2	107	..	127	2	15	17	14	2	228	1	275	2	17,472	22,401	..	33,881	306	73,754	306
Southland portion ..	..	7	11	1	77	..	95	1	14	34	20	8	560	8	636	8	63,734	78,104	958	22,253	90	164,091	1,048
Totals, 1940–41 ..	22	121	123	53	1,776	2	2,044	53	190	412	264	89	7,047	419	8,332	89	701,309	1,026,008	4,754	534,962	7,976	2,262,279	12,730
„ 1939–40 ..	32	111	121	51	1,777	7	2,048	51	194	377	272	76	7,076	492	8,411	76	699,417	958,854	3,777	505,892	6,779	2,164,163	10,556
„ 1938–39 ..	28	116	126	50	1,567	11	1,848	50	188	368	268	81	6,690	322	7,836	81	614,823	892,606	4,043	431,124	6,253	1,938,553	10,296

Sawmilling and Sash and Door Manufacturing, 1940–41—*continued.*

Provincial District.	Expenses of Operation, other than Salaries and Wages and Cost of Materials.																				Cost of Materials used or operated upon.			
	Production of Logs at Mill.							Production of Sawn Timber from Logs.							Resawing, Dressing, and Manufacturing from Sawn Timber.							Stumpage.	Logs purchased.	Rough-sawn Timber purchased and other Materials.	Total.
	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total.	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total.	Rent.	Cost of Power.	Fire and Accident Insurance (Premiums).	Depreciation.	Repairs.	Other Expenses.	Total.				
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Auckland ..	518	15,425	9,945	32,594	36,333	45,477	140,292	3,323	9,587	18,094	24,607	41,320	54,722	151,653	6,868	7,433	11,132	9,157	18,280	26,285	79,155	122,544	131,836	921,625	1,176,005
Hawke's Bay ..	141	1,185	717	860	1,146	1,175	5,224	133	1,106	2,017	1,735	4,953	7,197	17,141	151	706	779	821	1,556	2,986	6,999	14,010	6,232	57,537	77,779
Taranaki ..	140	1,664	2,826	11,123	9,136	770	25,659	764	475	3,411	3,255	9,679	4,387	21,971	290	1,054	2,154	2,150	3,593	3,590	12,831	30,844	31,025	88,468	150,337
Wellington ..	206	3,564	4,564	11,183	17,486	12,520	49,523	617	1,658	7,104	7,942	18,043	22,951	58,315	5,249	2,756	4,663	6,344	5,070	7,092	31,174	49,200	27,729	305,538	382,467
Marlborough ..	20	552	283	215	426	696	2,192	26	246	435	588	1,123	809	3,227	..	97	12	40	15	156	320	2,442	..	1,379	3,821
Nelson ..	520	6,692	4,148	6,939	13,409	19,076	50,784	806	3,799	4,449	5,627	10,146	11,045	35,872	751	1,335	643	880	615	2,007	6,231	35,487	2,202	56,360	94,049
Westland ..	1,415	6,377	5,001	8,590	15,068	10,883	47,334	1,147	2,836	7,653	7,104	15,045	13,795	47,580	..	110	28	22	38	119	317	39,016	..	4,440	43,456
Canterbury ..	81	1,983	688	490	733	1,236	5,211	256	2,883	1,832	1,507	3,512	3,704	13,694	1,346	4,092	4,547	4,587	4,839	6,795	26,206	6,963	27,855	201,347	236,165
Otago—																									
Otago portion	72	1,231	881	823	4,146	605	7,758	197	736	1,401	1,153	3,318	1,848	8,653	1,894	1,501	2,028	2,022	2,373	6,868	16,686	6,751	623	71,211	78,585
Southland portion	336	4,754	3,678	4,858	9,537	3,379	26,542	670	1,258	3,490	3,514	8,259	8,659	25,850	250	1,396	1,542	1,724	2,603	3,765	11,285	17,872	999	67,251	86,122
Totals, 1940–41	3,449	43,427	32,731	77,675	107,420	95,817	360,519	7,939	24,584	49,886	57,032	115,398	129,117	383,956	16,799	20,480	27,528	27,747	38,987	59,663	191,204	325,129	228,501	1,775,156	2,328,786
,, 1939–40	3,068	36,095	30,490	63,089	111,367	86,149	330,258	8,851	22,982	50,117	55,629	110,286	130,935	378,800	16,448	18,942	25,130	24,335	32,911	55,825	173,591	301,976	244,688	1,705,806	2,252,470
,, 1938–39	2,820	28,343	28,328	66,204	99,859	80,358	305,912	9,466	19,870	45,316	47,863	99,195	120,438	342,148	10,174	17,359	23,787	21,652	30,903	64,189	168,064	290,722	271,286	1,429,701	1,991,709

Provincial District.	Total Costs of Operation (including Salaries and Wages).				Products.															Total Value of all Products.
	Felling, Hauling, and Delivering Logs at Mill.	Production of Sawn Timber from Logs.	Resawing, Dressing, and Manufacturing from Sawn Timber.	Total.	Log Sawmill Products.				Resawing and Planing-mill Products.											
					Rough-sawn Timber.		Laths, Posts, Waste Products, &c.	Total.	Planed Flooring, Skirting, Moulding, &c.		Sashes and Doors.	Joinery.	Butter-boxes.	Cheese-crates.	Fruit-cases.	Other Products.	Total.	
					Quantity.	Value.			Quantity.	Value.								
	£	£	£	£	Ft. B.M.	£	£	£	Ft. B.M.	£	£	£	£	£	£	£	£	£
Auckland	473,462	677,392	1,234,245	2,385,099	116,505,156	1,220,025	3,234	1,223,259	37,865,508	728,424	124,514	127,329	209,562	19,057	35,036	63,966	1,307,888	2,531,147
Hawke's Bay	38,698	63,915	80,843	183,456	12,844,905	123,640	583	124,223	1,842,393	32,065	6,119	1,494	38	6,836	28,649	6,200	81,401	205,624
Taranaki	120,103	135,152	149,656	404,911	27,503,410	272,712	4,413	277,125	3,222,983	51,452	14,586	26,573	22	16,956	..	26,675	136,264	413,389
Wellington	195,064	221,043	432,308	848,415	42,220,899	453,304	4,409	457,713	12,041,516	260,555	50,737	63,329	11,703	23,778	174	51,339	461,615	919,328
Marlborough	9,948	9,846	2,213	22,007	2,241,216	21,494	733	22,227	15,100	352	73	67	..	..	1,586	55	2,133	24,360
Nelson	175,698	136,053	80,168	391,919	38,169,256	322,431	2,904	325,335	1,204,360	20,403	2,240	2,260	4,035	4,635	45,215	12,178	90,966	416,301
Westland	209,867	186,768	6,333	402,968	55,040,809	460,409	1,040	461,449	340,823	4,040	..	..	2,523	..	..	..	6,563	468,012
Canterbury	23,988	75,462	300,569	400,019	12,505,333	101,200	1,268	102,468	7,814,068	144,827	11,510	45,680	2,908	2,496	25,980	91,534	324,935	427,403
Otago—																		
Otago portion ..	31,981	31,677	122,084	185,742	8,435,742	68,887	919	69,806	3,323,952	74,486	10,544	31,129	..	1,962	2,182	18,542	138,845	208,651
Southland portion ..	108,148	105,911	100,879	314,938	26,741,118	245,230	320	245,550	2,352,593	36,058	..	..	1,608	14,605	10,919	26,985	90,175	335,725
Totals, 1940–41	1,386,957	1,643,219	2,509,298	5,539,474	342,207,844	3,289,332	19,823	3,309,155	70,023,296	1,352,662	220,323	297,861	*232,399	*90,325	*149,741	297,474	2,640,785	5,949,940
,, 1939–40	1,331,651	1,586,119	2,392,068	5,309,838	335,991,282	3,198,552	24,159	3,222,711	68,862,492	1,293,344	230,839	366,920	186,488	61,782	138,738	229,772	2,507,883	5,730,594
,, 1938–39	1,211,457	1,510,083	2,035,142	4,756,682	316,715,882	2,935,105	32,317	2,967,422	69,636,088	1,210,492	133,451	210,801	172,552	52,329	131,355	196,301	2,107,281	5,074,703

* Butter-boxes made numbered 2,495,511; cheese-crates, 1,447,641; fruit-cases, 3,928,084.

Provincial District.	Motive Power used for: Hauling and Delivering — Kind of Engine: Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.	Water.	Total.	Total Horse-power available.	Production of Sawn Timber from Logs — Kind of Engine: Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.	Water.	Total.	Total Horse-power available.	Resawing, Dressing, and Manufacturing from Sawn Timber — Kind of Engine: Steam.	Gas.	Petrol and Light Oil.	Oil (Heavy).	Electric.	Water.	Total.	Total Horse-power available.	Approximate Value. Sawmill: Land and Buildings.	Tramways and Tram Plant.	Logging and Hauling Equipment.	Other Machinery	Total.	Planing and Resawing Mill: Land and Buildings.	Tramways.	Other Machinery	Total.	Total Value.
																									£	£	£	£	£	£	£	£	£	£
Auckland ..	84	..	63	32	20	..	199	7,344	97	..	31	8	94	..	230	6,898	15	..	6	2	466	..	489	6,009	144,016	153,692	174,438	189,878	662,024	108,271	9,324	115,050	232,645	894,669
Hawke's Bay	8	..	5	2	..	..	15	310	11	..	..	..	17	..	28	827	3	..	1	..	45	1	50	407	6,416	1,857	9,892	16,752	34,917	16,885	789	6,745	24,419	59,336
Taranaki ..	24	..	5	4	..	..	33	852	18	..	..	..	8	..	26	593	2	..	..	..	56	..	58	696	21,161	62,201	17,701	33,233	134,296	24,467	..	19,089	43,556	177,852
Wellington ..	38	..	14	14	..	..	66	1,681	38	..	4	6	11	2	61	1,736	5	..	1	..	192	..	198	2,209	62,124	43,264	55,298	78,051	238,737	143,135	..	50,172	193,307	432,044
Marlborough	4	..	3	..	..	..	7	102	3	..	..	4	..	..	7	198	..	..	..	..	1	..	1	17	707	..	2,672	2,431	5,810	800	..	400	1,200	7,010
Nelson ..	46	..	40	8	1	2	97	2,003	28	..	11	15	33	1	88	2,412	5	..	1	2	38	1	47	495	34,329	37,604	32,408	53,112	157,453	13,099	..	11,831	24,930	182,383
Westland ..	68	..	29	2	7	..	106	2,716	33	..	3	5	29	..	70	2,203	2	..	..	..	6	..	8	141	41,214	74,696	37,478	62,134	215,522	300	..	464	764	216,286
Canterbury	2	..	2	3	..	..	7	156	4	..	3	1	50	..	58	1,068	4	..	..	..	265	..	269	2,275	7,302	..	5,672	11,251	24,225	53,217	4,262	34,265	91,744	115,969
Otago—																																		
Otago portion	14	..	8	1	..	..	23	368	14	..	2	1	..	..	17	404	2	..	..	..	65	..	67	945	7,472	5,868	3,621	18,750	35,711	29,965	..	18,590	48,555	84,266
Southland portion	43	..	16	3	..	..	62	938	38	..	5	..	12	..	55	1,017	4	..	2	..	37	..	43	441	14,940	24,365	14,727	36,759	90,791	9,895	95	21,909	31,899	122,690
Totals—																																		
1940–41	331	..	185	69	28	2	615	16,470	284	..	59	40	254	3	640	17,356	42	..	11	4	1171	2	1230	13,635	339,681	403,547	353,907	502,351	1,599,486	400,034	14,470	278,515	693,019	2,292,505
1939–40	337	3	134	85	14	..	573	13,790	293	2	39	40	238	3	615	16,684	50	..	11	6	1095	9	1171	13,375	353,948	404,565	309,121	496,707	1,564,341	352,018	13,488	225,999	591,505	2,155,846
1938–39	345	4	146	65	20	..	580	13,378	306	3	61	24	190	4	588	15,101	53	1	10	29	916	2	1011	12,521	345,262	429,428	250,685	499,345	1,524,720	306,224	3,020	227,171	536,415	2,061,135

Provincial District.	Number of Log-sawmills.	Approximate Sawn Output of various Kinds of Timber at Log-sawmills during the Year 1940–41: Kauri.	Rimu.	Kahikatea.	Matai.	Totara.	Beech.	Tawa.	Miro.	Pinus Insignis.	Other and Unspecified.	Total.	Average Mill Output.	Maximum Daily Capacity of Mills (8 Hours).	Area Cut.
		Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Ft. B.M.	Acres.
Auckland	109	3,048,208	69,260,099	9,680,928	6,506,390	5,664,571	5,886	1,165,792	727,162	19,893,970	552,150	116,505,156	1,068,855	669,400	9,892
Hawke's Bay	16	..	6,710,232	994,262	1,566,976	104,141	6,814	..	..	3,312,751	149,729	12,844,905	802,807	73,700	481
Taranaki	21	..	12,924,013	4,131,950	5,471,222	1,529,847	35,208	319,024	216,439	2,865,387	10,320	27,503,410	1,309,690	126,500	2,861
Wellington	44	..	21,260,003	2,148,543	7,862,827	5,521,329	39,367	51,706	1,082,688	4,191,883	62,553	42,220,899	959,566	237,900	3,036
Marlborough	7	..	1,333,664	104,226	51,392	11,257	121,553	..	..	563,742	55,382	2,241,216	320,174	16,300	362
Nelson	54	..	26,685,650	5,612,837	260,944	3,825	979,537	..	3,825	4,565,761	56,877	38,169,256	706,838	243,800	3,178
Westland	34	..	46,253,211	8,234,712	490,713	57,710	..	..	..	..	4,463	55,040,809	1,618,847	274,300	3,854
Canterbury	22	..	..	..	..	..	..	..	..	12,247,597	257,736	12,505,333	568,424	65,360	113
Otago—															
Otago portion ..	17	..	6,159,159	3,650	90,988	6,763	1,111,438	..	..	1,016,868	46,876	8,435,742	496,220	58,364	992
Southland portion ..	41	..	13,686,524	938,351	90,217	80,776	7,026,335	..	102,031	4,787,284	29,600	26,741,118	652,222	178,900	2,331
Totals, 1940–41 ..	365	3,048,208	204,272,555	31,849,459	22,391,669	12,980,219	9,326,138	1,536,522	2,132,145	53,445,243	1,225,686*	342,207,844	937,555	1,944,524	27,100
„ 1939–40 ..	363	5,065,511	207,097,147	33,042,708	21,212,036	10,881,801	9,007,986	459,239	1,084,201	46,762,410	1,378,243	335,991,282	925,596	1,931,772	25,622
„ 1938–39 ..	360	6,203,329	188,536,482	33,432,487	22,776,208	11,237,379	9,036,299	116,534	2,473,464	41,867,513	1,036,187	316,715,882	879,766	1,903,102	25,478

* Details for 1940–41 include Douglas fir, 336,294 ft. b.m.; tanekaha, 198,379 ft. b.m.; blue gum, 195,915 ft. b.m.; poplar, 153,447 ft. b.m.; rata, 70,542 ft. b.m.; mangeao, 50,315 ft. b.m.; pukatea, 36,362 ft. b.m.; kamahi, 36,222 ft. b.m.; taraire, 30,806 ft. b.m.; rewarewa, 23,060 ft. b.m.; puriri, 18,875 ft. b.m.; maire, 15,602 ft. b.m.; macrocarpa, 15,468 ft. b.m.; stringy bark, 7,325 ft. b.m.; other and unspecified, 37,074 ft. b.m.

GLOSSARY.

1. Indigenous.

(*a*) *Softwoods :—*
Kauri (*Agathis australis*).
Matai (*Podocarpus spicatus*).
Miro (*Podocarpus ferrugineus*).
Rimu (*Dacrydium cupressinum*).
Silver-pine (*Dacrydium colensoi*).
Totara (*Podocarpus totara*).
White-pine (*Podocarpus dacrydioides*).

(*b*) *Hardwoods :—*
Beech (*Nothofagus* spp.).
Silver beech (*Nothofagus menziesii*).
Tawa (*Beilschmiedia tawa*).

2. Exotic.

(*a*) *Softwoods :—*
Corsican pine (*Pinus laricio*).
Douglas fir (*Pseudotsuga taxifolia*).
Fijian kauri (*Agathis vitiensis*).
Insignis pine (*Pinus radiata*).
Japanese cypress (*Cryptomeria japonica*).
Larch (European) (*Larix decidua*).
Loblolly pine (*Pinus taeda*).
Longleaf pine (*Pinus palustris*).
Redwood (Californian) (*Sequoia sempervirens*).
Slash pine (*Pinus caribaea*).
Ponderosa pine (*Pinus ponderosa*).
Western red cedar (*Thuja plicata*).

(*b*) *Hardwoods :—*
Australian hardwoods, principally *Eucalyptus* spp.
Oak (*Quercus* spp.).
Samoan-grown teak (*Tectona grandis*).

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